CHALLENGES OF INSTITUTIONAL ADAPTATION: EXTENDED PRODUCER RESPONSIBILITY IN PLASTIC PACKAGING OF WOOD PRODUCTS

PRO GRADU

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Tiivistelmä — Referat — Abstract

The use of plastics has remarkably increased during the last 50 years. Due to its multi-use possibilities, durability and low cost the use of plastics is expected to double within the next twenty years. Despite the many benefits of plastics, the negative impacts to the environment, such as marine plastic, have raised the public attention and accelerated the demand for legislative action. To respond to these challenges, the European Commission (EC) engaged in developing a set of policies, such as the action plan for circular economy in 2015 which aimed to reduce the use of plastics and to enhance the recycling and reusing of plastics already in circulation.

In 2018 the EC introduced a set of revised directives regarding the extended producer responsibility (EPR). I wanted to understand how this revised EPR scheme would be implemented into national legislation, and how it would be confronted by organisations such as ones dealing with wood products. Additionally, I also mapped the potential managerial implications for stakeholders resulting from the implementation of the scheme.

I operationalised Primmer's (2011) framework of institutional adaptation which builds on two complementary strands of literature; policy implementation and organisational adaptation. The two focal research questions that derived from the framework were: How did the involved actors recognise and perceive the challenges in 1) implementing and 2) adapting to the extension to the existing EPR scheme in the use of plastic packaging of wood products? The data were collected by conducting seven semi-structured interviews with representatives of stakeholder organisations. The insights were explored and reported from these data via the means of qualitative content analysis.

Considering the complexity of policy and the diversity of organisations across Finland – and the European Union, legislators are in a rush to implement the new requirements of the directives into the national legislation. Based on my studies the involved actors recognised the various challenges in the implementation and adaptation processes. There were also expectations that the policy will drive learning and innovation among organisations. Currently, legislation is the major driving factor in the development of plastic recycling and EPR schemes can be a robust legislative tool in attaining the targets, when developed and maintained accordingly.

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environmental problems, policy implementation, organisational adaptation, extended producer responsibility

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Tiivistelmä — Referat — Abstract

Muovien käyttö on lisääntynyt huomattavasti viimeisten 50 vuoden aikana. Monikäyttöisyytensä, kestävyytensä ja edullisuutensa vuoksi muovien käytön odotetaan kaksinkertaistuvan seuraavien 20 vuoden aikana. Muovien monista eduista huolimatta kielteiset vaikutukset ympäristöön, kuten merimuovit, ovat ovat olleen julkisen huolen kohteena ja siten kiihdyttäneet kysyntää lainsäädännöllisille toimille. Vastatakseen näihin haasteisiin Euroopan komissio on kehittänyt joukon toimenpiteitä, kuten kiertotaloutta koskevan toimintasuunnitelman vuonna 2015, jonka tavoitteena on vähentää muovien käyttöä sekä tehostaa sen kierrätystä ja uudelleenkäyttöä.

Vuonna 2018 komissio julisti joukon direktiivejä liittyen laajennettuun tuottajavastuuseen (EPR). Tavoitteeni oli tutkia, miten tämä uusi EPR-suunnitelma aiotaan saada osaksi kansallista lainsäädäntöä ja miten se vaikuttaa puutuotteiden parissa toimiviin organisaatioihin. Lisäksi kartoitin lain kansallisesta täytäntöönpanosta seuraavia mahdollisia käytännöllisiä seurauksia näille sidosryhmille.

Tutkimukseni perustui Primmerin (2011) institutionaalisen sopeutumisen viitekehykseen, joka perustuu kahteen toisiaan täydentävään osioon; politiikan toimeenpanoon ja organisaation mukauttamiseen. Kaksi viitekehykseen perustuvaa tutkimuskysymystä olivat: Kuinka mukana olevat toimijat tunnistivat ja havaitsivat haasteet EPR-lainsäädännön 1) täytäntöönpanossa ja 2) siihen sopeutumisessa, käyttäen esimerkkinä puutuotteiden muovipakkausten käyttöä ja kierrätystä? Tutkimusaineisto kerättiin tekemällä seitsemän osarakenteista haastattelua sidosryhmäjärjestöjen edustajien kanssa. Saatua tieto tutkittiin ja raportoitiin laadullisen sisältöanalyysin avulla.

Ottaen huomioon politiikan monimutkaisuus ja organisaatioiden monimuotoisuus Suomessa – ja laajemmin Euroopan unionissa, lainsäätäjillä on kiire siirtää direktiivien uudet vaatimukset osaksi kansallista lainsäädäntöä. Tutkimusteni perusteella mukana olevat toimijat tunnistivat erilaiset haasteet toteutus- ja sopeutumisprosesseissa. Odotettiin myös, että EPR:n toimeenpano edistää oppimista ja innovaatioita organisaatioissa. Tällä hetkellä voidaan arvioida, että lainsäädäntö on tärkein muovien kierrätyksen kehitystekijä, ja EPR-järjestelmät voivat olla vankka lainsäädännöllinen apuväline tavoitteiden saavuttamisessa, kun niitä kehitetään ja ylläpidetään oikealla tavalla.

Avainsanat — Nyckelord — Keywords

ympäristöongelmat, politiikan täytäntöönpano, organisaation sopeutuminen, laajennettu tuottajavastuu

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Part of these results serve for the development of relevant customer services of Stora Enso Wood Products.

Helsinki, 26 October 2020

Juho J. Kuukka

Contents

1. INTRODUCTION

The phenomenon of waste generation has been seen as one of the main threats for the environment and the people, it is the by-product of the current economic and social way of life (Steenmans and Marriott, 2017). Among the many sources of waste, such as electronic waste (for example, Sovacool, 2019), both policymakers and the public have recently paid attention to the perils caused by plastic waste – for example, millions of tons of plastic are piling up in oceans through rivers and reservoirs (Eriksen et al., 2014; Lebreton et al., 2017).

Within the last 50 years the relevance of plastics has grown remarkably, since the 1960s the production of plastic across the globe has risen twenty-fold. The current estimate is that the production will double within the next twenty years. Plastic is a widely used material in the modern world. It is used on all the fields of life. It is durable and cheap and can be used in many ways. It helps to keep our daily food fresh and free of bacteria. plastic composites are light and replace the use of metal which attributes to energy efficiency on issues such as transportation. Plastic also has its downsides, as it's so easy and cheap to produce, it gets produced in large quantities and a portion is discarded to the nature where it turns from a beneficial product to a negative one (European Commission, 2018). According to World Economic Forum and Ellen MacArthur Foundation (2016), it is estimated that the global economy loses 95% of plastic packaging value which is yearly €70-105 billion after the material has been used once for a short period of time.

Currently in the European Union (EU) the potential for plastic recycling has been left unused. When comparing to other materials like paper, glass and metal, plastic is poorly reused and recycled (European Commission, 2018). In 2018, 29,1 million tons of plastic waste was collected in Europe: 33% of it was recycled, 43% was burned for energy recovery and a quarter was sent to landfill. The share of landfill has decreased 44% from 13 tons in 2006 to 7 tons in 2018 (Plastics Europe, 2019). In Europe the demand for recycled plastic covers about 6 percent of total demand of plastics. During recent years the recycling industry has been suffering from low prices and uncertain demands. The profitability has been poor which has hindered investments to the business (European Commission, 2018).

To respond to these challenges, the EU has engaged in developing a set of policies to reduce the use of plastics and to enhance the recycling and reusing of plastics that are already in circulation. In 2015, the European Commission approved an action plan for circular economy, which was soon complemented by the first ever Europe-wide strategy on plastics. One of the concrete instruments to achieve these goals is the amendment (2018/852) to the previous EU Directive 94/62/EC concerning packaging and packaging waste. While predominantly aiming to streamline actions across the EU member states and to alleviate the negative externalities of plastic packaging, the amendment also contains a section for what is known as *extended producer responsibility* (EPR) – that is, an approach to extend producer's responsibility, be it physical and/or financial, for a product to the post-consumer stage of the product's life cycle (OECD, 2016). Additionally, such an extension is relevant to producers beyond the domain of plastics industry – for example, the wood products industry also uses plastics for the protection of their merchandise.

However, this shift towards EPR introduces complexity and poses challenges to both public and private actors, including legislators, producers of plastics, and intermediary users of plastics (such as the wood products industry) who have both implementing responsibilities as well as strategic and operational opportunities at stake. A central role in interpreting and responding to extended producer responsibility is held by those who either generate waste or who fall under its sphere of influence. The decisions and related adjustments that may take years to prepare vary from reallocating resources within annual planning to everyday operational decisions. The end users of plastics, be they industrial customers (such as those using wrapping for laminated veneer lumber) or households, must also be informed of the relevant infrastructure and related recycling practices, and perhaps trained to act differently than before in order to comply with the EPR criteria. An utterly important question in this regard is how are such decisions, and the actors who are making them, influenced by policies on the one hand, and the signals from the society, on the other (cf. Primmer, 2011)?

To realise effective and efficient, even equitable, policy implementation, it is important to understand the responses of relevant actors and stakeholders in national contexts. In line with this reasoning, my objective in this thesis is to understand and examine the

capacity of existing actors and institutions to adapt to the EPR imposed by the European Commission (EC). Additionally, I chart the potential impacts for Finnish stakeholders that could result from this new piece of regulation. In so doing, I operationalise Primmer's (2011) framework of institutional adaptation that builds on two complementary strands of literature; policy implementation and organisational adaptation. The factors influencing *institutional adaptation* cover issues such as recognition of demand, complexity, learning, and isomorphism. Investigations that would have intended to combine the two bodies of literature have never been applied to the case of EPR; in fact, the example of applying the framework is Primmer's (2011) original study on the incorporation of biodiversity conservation into forestry remains unique in its scope and rigour. I will conduct semi-structured interviews with representatives of stakeholder organisations, and, finally, I explore and report insights from these data through the means of qualitative content analysis. This thesis is guided by two focal research questions that derive from the framework and focus on the challenges of institutional adaptation to the extension to the existing EPR scheme:

*1. How do involved actors recognise and perceive the challenges, such as complexity and professional factors, in **implementing** the extension to the existing EPR scheme in the use of plastic packaging of wood products?*

*2. How do involved actors recognise and perceive the challenges, such as recognition of social demand, in **adapting** to the extension to the existing EPR scheme in the use of plastic packaging of wood products?*

This thesis is organised as follows: next chapter provides a detailed account of EPR and its connection to other relevant strategies and policies at the EU level; chapter three introduces institutional adaptation as the conceptual framework; chapter four presents my data and methods; chapter five outlines the main findings of this study; and chapter six concludes and discusses implications for policy, practice, and future research.

2. ISSUES WITH PLASTICS

2.1 Challenges of plastic waste

Large amounts of plastic waste leak into the environment both at land and at sea, causing massive economic and environmental damages (Jambeck et al., 2015). For example, according to the World Economic Forum (2016), an equivalent of one garbage truck of plastic waste enters the sea every minute. Unless this changes, the amount of plastic entering the ocean is projected to triple from 13 million tonnes this year up to 29 million tonnes in 2040. This amount equals 50 kilograms of plastic waste entering the ocean for every metre of coastline. To make things worse, it could take centuries for most of the plastics that have already entered the ocean to dissolve and vanish. However, if broken down into tiny pieces, some of those plastics gradually passes up the food chain, potentially causing a range of other vicious problems (Lavers and Bond, 2017). According to the report by Grid-Arendal and United Nations Environment Programme (2016) the damage to marine ecosystems alone amounts to 8 billion US dollars annually.

The situation in the EU also contributes to this global problem, although to a lesser extent: every year between 0.2 and 0.5 million tonnes of plastic waste flows into the oceans from the EU (Sherrington et al., 2016). However, trash originating from European sources ends up in particularly fragile marine ecosystems such as the Mediterranean or certain parts of the North Sea. According to some of the most recent studies, rafts of plastic build up in the Mediterranean as fast as in the areas with the highest plastic build up. In addition to causing environmental damage, the build-up of waste in aquatic ecosystems also leads to economic loss in tourism, fishing, and seafaring industries. For example, the whole fishing fleet of the EU suffers a loss of about one percent from the total catch due to marine waste (Maes et al., 2017).

Importantly, plastic waste is not only about ocean pollution. It has been estimated that plastic production and plastic waste incineration cause total emissions of 400 million tonnes of CO2 annually, thus exacerbating dangerous climate change (Lenton et al., 2019; World Economic Forum, 2016). If the usage of recycled plastics would increase, the dependence on fossil fuels for plastic production could reduce and so would the

carbon emissions (Tolinski, 2011; Villanueva and Eder, 2014). As most plastics in the world are processed from oil, the annual energy savings could reach the equivalent of 3.5 billion barrels of oil if all those plastics were recycled (Rahimi and García, 2017). Currently, plastics from alternative raw materials, such as bio-based materials, CO2, or methane) that have the same properties as conventional plastics but possibly lower environmental impacts, are under development. However, at least in Europe, demand for recycled plastics has been about 6% of the total plastic demand (Villanueva and Eder, 2014). The outlook for making the recycling of plastics a profitable business has been weak, slowing down investments in new recycling capacity across the EU.

Regarding the potential of biochemicals as a raw material for plastic, it has been estimated that the share of bioplastics production is expected to reach 5 percent within the next 20 years from a level of 0,4 percent in the early 2010s. (Byun and Kim, 2013). The market prospects for bioplastics are in rise and expected to reach 4,3-6,7 billion euros in 2030 (Aeschelmann and Carus, 2015). However, majority of this increase is driven by the fossil plastic market which is expected to nearly quadruple by the year 2030. Naturally, this also translates to a four-fold increase in plastic pollution (WEF, 2016). The development of a robust and a steady supply chain is going to take several decades to meet the production level of 100 000 tonnes (de Jong et al., 2012).

The forest industry has been slow to react to the rising demand of bioplastics due to technical and economic issues. Wood-plastic composites (Carus et al., 2017), paper-resembling packaging films (Kruus and Hakala, 2017), rigid plastic resembling fibre-mixed materials (Nägele et al., 2002) and other plastic-mimicking products produced with the existing industrial infrastructure are the most likely indirect substitutes to come out from the forest industry by 2030.

As the global population and the economic standards of living increase, it drives the bioplastic packaging market due to increasing e-commerce and a need for take-away products. EU regulations, for example, banning of single-use plastic products further drives the incorporation of alternative sustainable materials into the supply chain (EC, 2018). Property requirements for new alternative materials are biodegradability, recyclability, durability, lightness and safety to consumers. Aside from having lower

environmental impacts, new biodegradable products are expected to lower the levels of microplastic (WEF, 2016)

Perhaps the main difficulty that plastics pose for recycling is that plastic is most often intended for single-use so the packaging or consumer product is rapidly discarded and rarely recycled. Such products refer to packaging such as bags, disposable cups with plastic coating as well as their lids, straws, and cutlery. The lightness, low cost, and practicality of using plastics in packaging is behind its popularity. Plastics Europe (2019) estimates that the annual plastics demand in Europe is around 49 million tonnes, of which around 26 million tonnes ends up as plastic waste. As shown in Figure 1, vast majority of plastic waste in the EU originates from packaging.

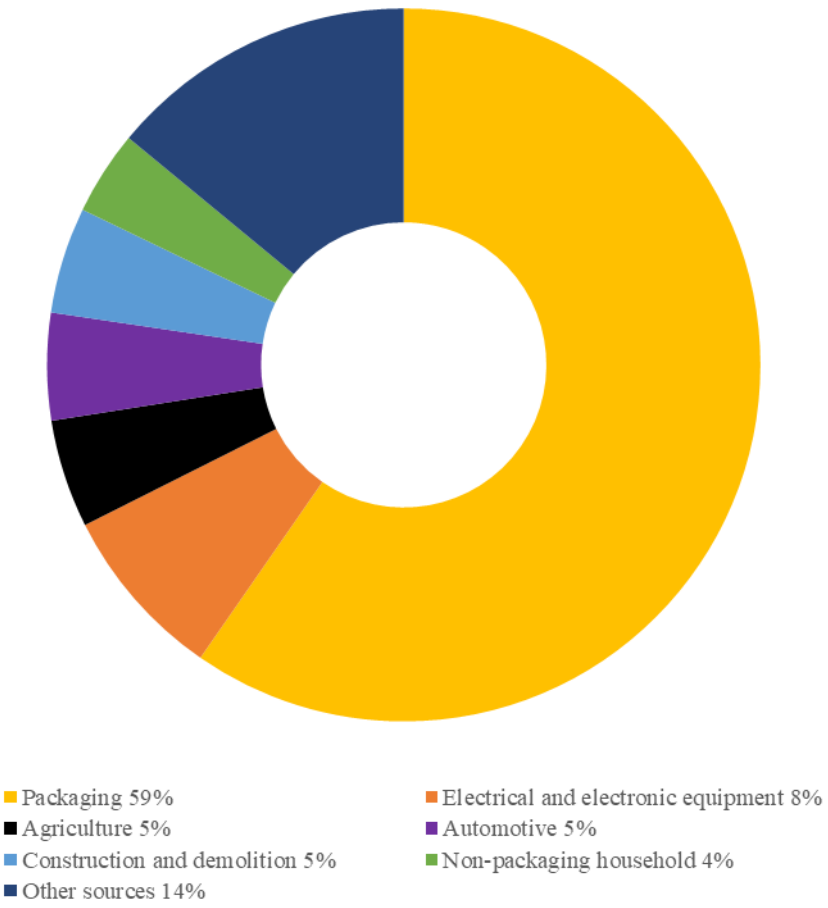

Figure 1. Plastic waste generation in the European Union in 2015 (Sherrington et al., 2016).

Beyond individual consumption, plastic has also been the standard protective wrapper for many wood products that are headed to industrial use, such as timber in

construction. In such business-to-business uses, plastic packaging has become the norm for the same reasons as in the business-to-consumer segment: lightness, low cost, and practicality. However, this norm has now come under fire for the above reasons. The strongest policy response has come from the side of the EU. The response has largely been wrapped under the 2019 Circular Economy Package (CEP), which aims to bring the many problems with plastics to bay.

2.2 Policy response

The CEP is the main response to the plastics dilemma at the European level. It includes four separate, yet interconnected elements: The Plastics Strategy (PS), the Single Use Plastics Directive (SUP), the Waste Framework Directive (WFD), and the Packaging and Packaging Waste Directive (PPWD). The former two fall under the 2015 Circular Economy Action Plan, while the latter two are legal revisions (from 2018) to existing directives (Figure 2). I hereby briefly summarise the content of the two first elements and focus on the WFD and PPWD that explicitly refer to the significant extension to the existing EPR.

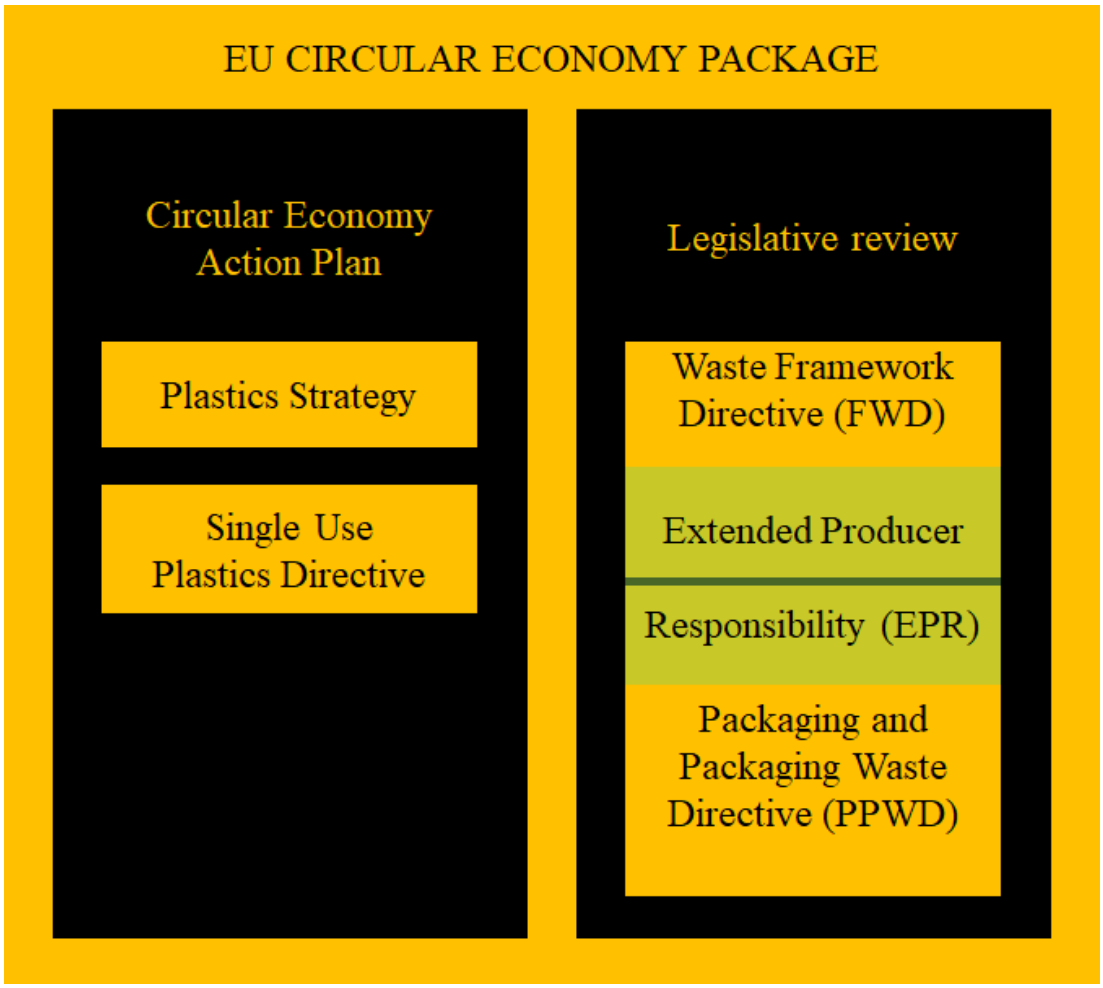

Figure 2. The many elements of the EU Circular Economy Package

The main aim of the Plastics Strategy is that all plastics in circulation in the EU are either reusable or recyclable by 2030. Additionally, it outlines four more specific goals: making recycling profitable for business; curbing plastic waste; driving investment and innovation; and spurring change across the world. It established a Circular Economy Finance Support Platform to raise awareness among investors and to facilitate access to finance for circular economy projects. It draws funding from European Fund for Strategic Investment that in turn focuses on supporting greater integration of value chain and projects for closed-loop plastics recycling. The Single Use Plastics Directive, in turn, intends to reduce plastic waste generation in the consumer end through a set of measures aiming to cut consumption, to restrict supply, to raise awareness, as well as to impose requirements on the design and labelling of plastic products. The EC asserts that the Circular Economy Action Plan aligns along other goals, such as the so-called “Energy union” and objectives of the 2015 Paris Agreement. (European Commission, 2018)

As the name of the directive suggests, the WFD provides the broader overarching framework convention for the production, consumption, recycling, and general treatment of all kinds of waste in the EU. Its 2018 revision (article 8A) also mentions the extension to the previous EPR system in the EU. The 2018 revision of the PPWD (2018/852), in turn, is the latest amendment to the original PPWD (94/62/EC) that entered into force already in the nineties. The original PPWD contains a set of rules on managing packaging and packaging waste; like WFD, it applies to packaging of all kinds that is placed on the market in the EU, regardless of where it is used or released and of what material it is made of. However, the revision provides much more guidance on activities with the aim of contributing to the transition to circular economy. The main activities cover prevention of excess production of packaging waste, reduction of the final disposal of materials by encouraging reuse, and enhancement of recycling and other forms of recovery methods.

More specifically, the revised PPWD explicitly states that every EU member state must carry out measures to halt the production of packaging waste and to minimise the negative externalities. EU member states are expected to guarantee the erection and functioning of all necessary systems that enable the collection and return of used packaging materials as well as the reuse or recovery of the packaging that has been collected. Additionally, the directive sets recycling targets for its member states. The share of all recycling must be increased, first, to a minimum of 50% of plastic package waste by weight by the end of 2025, and, second, to 55% by the end of 2030. Member states must also report the annual results to the EC. (European Parliament, 2018)

One of the key measures of achieving those targets is the extension to the existing EPR. To justify such a move, the EU legislators argue that it is more often the producer rather than the consumer who is making the choices concerning the amount and the form of packaging. The legislators assert that an effective EPR system is bound to general positive environmental impact by reducing the generation of packaging waste and by increasing its separate collection and recycling (European Parliament, 2018). Even if they recognise that most EU member states already have EPR systems for packaging in place, there are considerable disparities in the ways that they are organised, in their economic efficiency, as well as in the scope of the responsibility of

producers. This extension thus aims to unify and streamline EPR systems to meet the ambitious, yet common goals under the CEP. The revised PPWD essentially forces every member state to establish such an EPR system in line with the goals for all types of packaging by the end of 2024. This implies varying degrees of adaptation manoeuvres in national settings, thus implying changes to costs and practices in exposed public and private organisations. Figure 3 provides a simple schematic of the current and desired states of the plastics value chain with EPR depicted as tool for enabling the necessary shift.

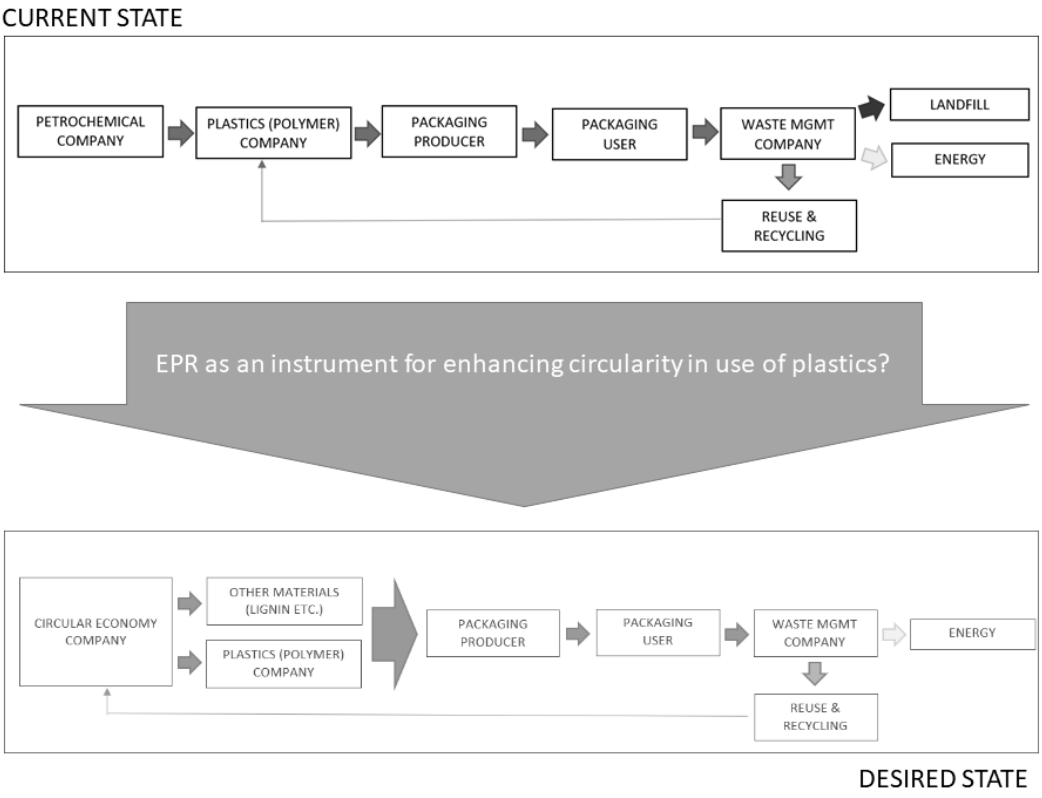

Figure 3. The desired value chain of plastic packaging (own elaboration)

2.3 Extended producer responsibility

EPR was put forth in 2000 as a concept by Lindhqvist (2000) and is described by the OECD (2016) as "an environmental policy approach in which a producer's responsibility, physical and/or financial, for a product is extended to the post-consumer stage of a product's life cycle". Its early applications were as a framework for science and industry as the fact of rising waste build-up and complexification became more apparent (OECD, 2016).

The centrepiece of EPR has always been the shifting of responsibility of collection and sorting of end-of-life products from the government to the producers who are the agents that can most effectively have a direct way to affect the production process. This is logical since producers are in the position best suited for assessing the production pathway from the beginning to the end of the product's life. The economic incentive of EPR is to make the producers integrate the costs of waste treatment and disposal into the product and to design it so to make the end-of-life collection effortless, efficient and profitable as possible. EPR is a typical second-best policy that functions as a tool to correct the imperfections of markets. The liability for the producers lies within the polluter pays principle (PPP) which provides a powerful way for EPR to regulate responsibilities between stakeholders (Alvarès and Rosa, 2017). When the producers are liable, they have an incentive to minimise the costs of environmental impact of their products.

EPR is not itself a legal apparatus but it must be carried out by the governmental and economic organisations involved. The OECD (2016) grouped the EPR scheme into four instrumental classes. First are the product take-back requirements which requires the creation of collection objectives for materials and products that the producer or retailer is then responsible (Watkins et al., 2017). Second are the economic and market-based instruments which as the name suggests, present economic incentives to the producers. These include, for example, advance disposal fees (ADF) and deposit refund systems (DRS) which are meant to cover the costs of collection and treatment. The costs are estimated and integrated to the final consumer price and are collected at the point of purchase (OECD, 2016; Watkins et al., 2017). Examples of a deposit-based systems in the EU are the metal and plastic beverage container collection systems (Watkins et al., 2017). Third are the regulations and performance standards which encompass the mandatory recycling rates and technical specifications. Lastly are the information-based instruments which are designed to raise public awareness on producer responsibility among consumers.

2.4 Key features of existing EPR schemes

EPR schemes can be implemented either by an individual producer (individual producer responsibility), by a collective of producers (collective producer responsibility), or by an organisation to whom the responsibility has been transferred by a group of producers (producer responsibility organisation).

Producer responsibility can be divided into financial and partial or full operational responsibility (Watkins et al., 2017). When the producers are in control of both the financial and the operational responsibility, the handling and treatment of waste is often subcontracted to waste management professionals or in some cases is handled by the producers themselves. Municipalities are responsible of waste management and producers are responsible of the financing in simple financial EPR scheme. In partial operational responsibility, municipalities are responsible of some of the organisational activities and a part is kept on the responsibility of the producer.

As mentioned earlier, the total expenses of the end-of-life products such as collection, sorting, logistics and treatment should be covered in the EPR schemes (Alvarès and Rosa, 2017). The True Cost Principle aims to keep the fees paid by the producers as realistic and up-to-date as possible, to match the real end-of-life costs. This prevents anyone from profiting from the economic principles of EPR.

2.5 Performance of EPR schemes in earlier literature

Several legislative EPR approaches have been implemented across the industrial sectors in Europe as well as on other continents. Here I will shortly examine the experiences and findings of these previously implemented systems.

The end-of-life vehicle (ELV) directive 2000/53/EC implemented by the EU was among the first EPR legislations that were designed to reduce the environmental impact during a product's lifetime in the automotive industry. The directive set goals to automotive manufacturers to minimise the use of hazardous substances, and which required that no mercury, hexavalent chromium, cadmium or lead was present in vehicles put to the market after the second half of 2003. Furthermore, the use of

recycled materials in the production process was to be maximized alongside with creating vehicle designs that considered easy disassembly, re-use and, recycling at the end of the lifecycle of the vehicle. With batteries and ferrous metal the recycling rate of hundred per cent had already been proved attainable (Funazaki et al., 2003) and with plastics the recycling rate had steadily increased. The overall observed benefits from the EPR type legislation resulted in lower use of toxic substances during manufacturing, the increased share of production materials that would be easier to recycle and improvements in the recycling processes (Gerrard and Kandlikar, 2007).

The Canadian product stewardship model is a legislative model which aims to cultivate all parties, from the producer to the end user, responsible for minimising the environmental impacts of the product. However, this approach proved to be ineffective in the reduction of plastic waste. The EPR program combined with other policy measures was detected to lead to more effective and sustainable product designs due to full responsibility of the product life cycle given to the producer. This enabled the prevention of pollution and waste generation in the first place. The study concluded that despite the essential need to maintain and improve the efficacy of the EPR program, clear goals for continuous improvements over time should be set and such incentives as deposit-refund systems should be used to steer consumer behaviour to boost the agenda of sustainability. (McKerlie et al., 2006)

In a study by Filho et al. the controversial nature of plastic usage was covered having both many benefits and at the same time being problematic for the environment and human health with the current use. Considering the rising demand for plastics in the near future, new legislative tools are needed to reach ambitious waste targets. EPR was regarded as one of the most promising ways of moving towards a circular economy and sustainability. Experiences from several EU Member States have shown the extendibility of EPR to other waste streams containing plastics is possible. While the focus has been packaging plastic, also plastics from other sources should be included in EPR systems. To achieve ambitious plastic recycling targets, more efficient collection and sorting to a wider range of plastic waste is needed in addition to optimising production and logistics pathways. (Filho et al., 2019)

In an study concerning recycling coalitions in China, Tian et al. (2020) stated that one of the key obstacles in recycling consumer products is the high cost of material separation process. The recovery of high-value parts such as components from consumer electronics was deemed too labour intensive which forced the recycling industry to resort to low-efficient grinding down of recyclates into less valuable raw materials (Oguchi et al., 2011). While the individual producers that are competing in the market are expected to maximise their payoff, they will have to form recycling coalitions to drive down the costs of recycling. This was found out to lead into conflicts of interest and is what the authors set out to study: in what conditions is it optimal to form either multiple coalitions or a single all-inclusive coalition (or none). The coalition formation of producers responsible for the disposal of end-of-life products, typical in EPR-type legislation, was studied and compared to models where the government is responsible. As the size of the recycling coalition increased, the fixed recycling costs went down due to the lucid economies of scale, which further on meant, that the cost of maintaining the recycling infrastructure is shared with participants of the coalition. The downside of this is the increase in the heterogeneity of the material streams due to the high number of producers and products which naturally leads to a rise in the costs due to extra effort needed in disassembly and separation (see also Dahmus and Gutowski, 2007). The study found that when the fixed recycling costs were low and when the heterogeneity was high, smaller recycling coalitions were preferred both by the producers and the government. One way of combating the challenges of heterogeneous waste is to recycle the products when they are still homogeneous. This can be achieved by the individual producer and is thus called Individual Producer Responsibility or IPR approach (Atasu et al., 2009). When the situation is reversed i.e. when fixed recycling costs are high and heterogeneity is low, an all-inclusive coalition is preferred (Tian et al., 2020).

Kinnunen and Kupiainen (2019) also studied the environmental effects of recycling plastic waste through an EPR scheme in construction business in Finland. They conducted a sorting research on construction site for 200 student homes in the city of Joensuu. The generated plastic waste types were identified, and carbon footprint was determined using a lifecycle assessment. Based on the results, 89-98% of the waste plastic was suitable for recycling which would lower the lifecycle carbon footprint by 50%. Incineration of the same plastic to energy would lower the carbon footprint by

25%. Their conclusion was that even as the recycling was not economically profitable, it had clear environmental advantages. The researchers concluded that recycling would be encouraged if its viability in economic terms could be improved somehow.

Taken together, the benefits achieved by the current EPR schemes are numerous. The efficiency of collection on a variety of waste streams has improved in addition with the development of waste materials which have wide secondary use potential to drive the development of secondary raw material markets (OECD, 2014). Monetary incentivisation for producers has hastened the development of eco-designs that minimise waste management costs (OECD, 2014). EPR implementation has helped to transfer the financial responsibility from the local governments and taxpayers to the producer. However, despite the many successes of EPR, multiple challenges have been recognised in different sectors. In the EU, the implementation of EPR schemes has been fragmented and heterogeneous which is enhanced by insufficient monitoring mechanisms. Packaging producers have also lagged behind in the development of more eco-friendly and circular designs (Alvarès and Rosa, 2017). The internalised costs between different waste streams have not yet been fully recognised due to the heterogeneous composition of waste streams.

3. CONCEPTUAL FRAMEWORK

3.1 Policy implementation and its challenges

According to Heclo (1972), public policy traditionally divides into two main points: the objective of policy and the tools for implementation. The public policy is expected to affect directly the target group, for example, a wood product company using plastic packaging. Companies and non-governmental organisations have a key role in the implementation of those parts of policy which are under their authority. However, there has been less focus on the roles of these organisational actors which implement their share of the policy. In cases where the actors have been studied, the scope has still been on the public administrations but also businesses and civil society organisations (O'Toole and Montjoy, 1984).

Public policy implementation has traditionally relied on the assumed ideals of the linear model: clear goals, measurable targets, standardised procedures, hierarchical control, and neutral administration (Saetren, 2005). Several arguments have been made that this reliance on even wider range of assumptions is reality with policies aiming to influence behaviour of actors (Ingram and Schneider, 1990; Mickwitz, 2003; Pressman and Wildavsky, 1973).

Ingram and Schneider (1990) have studied these assumptions and have argued that regulation instruments are connected to the assumption of legitimacy of hierarchical arrangements, economic instruments assume that utility maximation is what actors strive towards. Symbolic policy instruments assume that actors are driven by and can be steered by appealing to social norms and values. Informative instruments rely on the assumption that actors need, take on, and apply redundant information. All such assumptions are based on the prediction and assessment on how policies reach the targets they are supposed to.

The main criticisms presented against the concept of linear hierarchical policy implementation include complexity, plurality, and professional and organisational practices. The impossibility of control is a result of institutional and substantial complexity, along with limited resources for exercising the control (Denhardt and

Denhardt, 2000; Pressman and Wildavsky, 1973). The feasibility and legitimacy of the hierarchical logic has been questioned by a growing number of constituents and the commonly increasing need to consider pluralistic goals (Hajer and Wagenaar, 2003)

The general idea of governance has developed as a response to the accusations of plurality and as a result policy is increasingly considered to be created and implemented in networks, placing great focus on capacities when dealing, adapting, and learning with multiple interests and channels of knowledge. However, the organisational field and professional practices that shape policy receive little attention from the hierarchical linearity assumption (Lipsky, 1980; Pressman and Wildavsky, 1973).

Research has shown that professionals and organisations between policy and practice are significant in spotting the potential dangers in implementation, best practices for interacting with the local constituents, and the local reality (Lipsky, 1980; Pressman and Wildavsky, 1973). In this context, the policymakers' limited understanding of the local reality is traced to what is known as bounded rationality (see Jones, 2002). Its basic assumption is that as policymakers find policy issues in all directions and cannot devote attention to all of them, their rationality is thus directed towards goals based on individual choices and institutional aggregation. Lipsky (1980) has further named the professionals acting in this local reality as a sort of "street-level bureaucrats", who tend to have a mix of ambitious and ambiguous policy goals to implement as if they were the sole decision-makers (see also Tummers and Bekkers, 2014).

Primmer (2011) argues that acknowledging the implementation challenges posed by complexity, plurality and professional and organisational factors, the understanding of policy will improve, and its successful implementation becomes more likely. However, in order to fully grasp and analyse the responses to social and market demand for addressing the plastics problem and, consequently, for introducing an extension to the EPR scheme, the strand of literature on organisation adaptation that understands organisations as strategic actors becomes useful.

3.2 Organisational adaptation and its challenges

Following the criticism towards the linear hierarchical model of public policy, an idea of "new public management" has been introduced by Denhardt and Denhardt (2000). It seeks to assess the challenges of impossibility and costliness of control with putting pressure on economising, outsourcing, increasing accountability, and utilising the capabilities of stakeholders. This idea also goes by the name of "network governance" because of its ideals that rely more on legitimacy and democracy rather than just on the economic viewpoints (Hajer and Wagenaar, 2003). According to Primmer (2011), this trend of diversification has brought public and private sector organisations more together and promoted collaboration and sharing of best practices. Another important notion is, that both public and private organisations rely on external financial, physical, and informational resources, so the key for survival and success is the adaptability to change according to the surroundings (Pfeffer and Salancik, 2003). Hence, it could be said that the survival of an organisation builds on such foundational factors as budgetary allocations, increasing market shares, gaining higher profit margins, or organisational mandates and their legitimacy.

Hannan and Freeman (1984) have acknowledged several factors that can be used to measure adaptation challenges for organisations; there may be little *recognition of demand* for a change. For example, an organisation that misses to realise the awakening of pro-environmental attitudes among their clients may be unable to develop necessary competences to *learn and innovate* or to utilise its *social networks* to an adequate degree.

Learning and innovation requires certain level of prior competences and especially competences in learning; smart resource mobilisation is also important when deciding to what extent to build upon and develop an organisation's existing assets, and to what extent to explore new ideas and challenge the established organisational structures (Nelson, 1991). Despite the possible benefits of learning and innovation, Hannan and Freeman (1984) remind that such processes are often cumbersome and costly, and that investment does not always pay off.

Networks possessed by the organisation in turn serve as valuable asset to meet and manage emerging issues, they help to attain and exchange information and ideas, and also to propagate new relationships (Powell, 1990). *Inertia* in organisational adaptation literature is an attribute that slows down the reaction to change as a result of the organisation's prior self-sufficiency in implementing and/or adapting to policies or due to them being lower priorities in the organisation due to professional factors (Hannan and Freeman, 1984).

Additionally, another organisational adaptation challenge is *isomorphism*. It means that the organisations tend to develop homogenous patterns of operation instead of pursuing diversification. DiMaggio and Powell (1983) have identified three mechanisms that make organisations vulnerable to creating and maintaining such homogenous patterns; coercive isomorphism, mimetic isomorphism, and normative isomorphism. *Coercive isomorphism* is a result of political influence and can be understood as the explicit enforcement of regulation, for example, mandating manufacturers to adopt new technologies in order to conform to environmental legislation (Meyer and Rowan, 1977). *Mimetic isomorphism* drives its force from uncertainty in novel situations where the organisations are unsure of the best course of action (also known as the *iron cage*), and model themselves on other organisations (DiMaggio and Powell, 1983). However, it is important to note that mimicry is not explicitly a negative measure, as it can also yield a viable outcome with a minimal cost (Cyert and March, 1963). *Normative isomorphism* is the result of pressure toward homogenisation stemming from the phenomenon of professionalisation, which means the actors within the organisations adhere to similar beliefs and norms passed down from education (DiMaggio and Powell, 1983).

3.3 Institutional adaptation

When the previous two sections are brought under one roof, the concept of institutional adaptation may be further dissected. To be able to analyse and form a better understanding of the factors shaping the institutional adaptation of organisations in the face of the EPR extension, a joint operationalisation of two traditionally segregated strands of literature must be made, namely those of policy implementation (with a focus on the hierarchies, standards, and the local reality) and organisational adaptation

(with a focus on how organisations develop relevant competencies) sheds light on the mechanisms that could apply to all actors who are exposed to this specific policy (Figure 4). Importantly, this combination supports an institutional interpretation of deviations from conventional assumptions concerning policy implementation. In so doing, it can advance our understanding of institutional adaptation to some of the consequences of environmental change and related policies that intend to address them (Primmer, 2011, p. 1830).

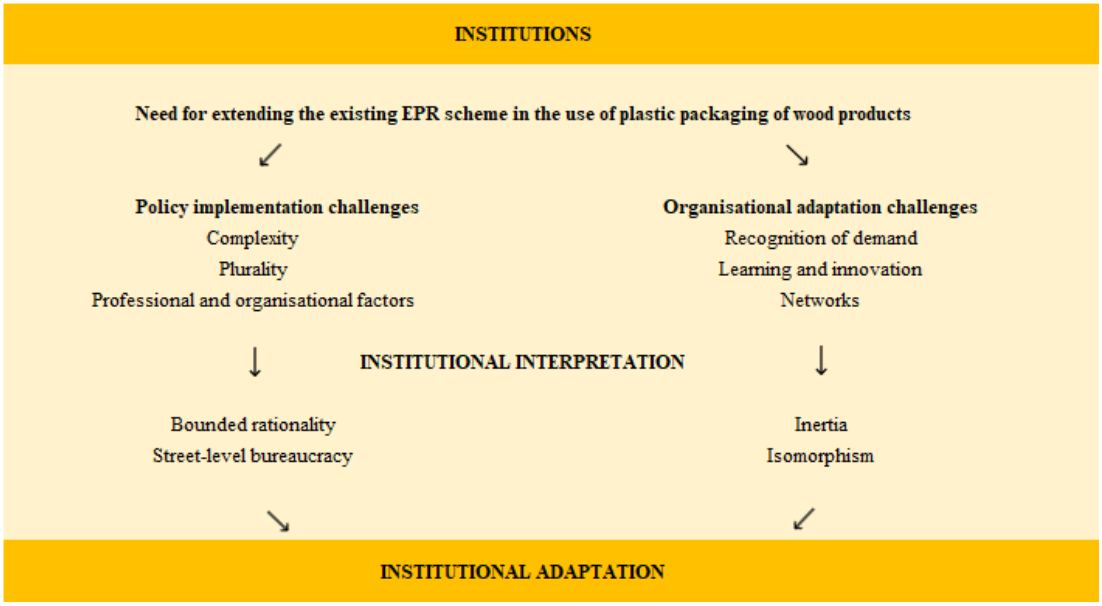

Figure 4. Conceptual framework for the analysis of institutional adaptation in the context of an extension to the EPR scheme (adapted from Primmer, 2011)

This thesis builds on the above framework and applies it to a qualitative study involving an organisational field spanning both public and private actors: organisations dealing with or exposed to the sphere of influence of the new EPR extension. The choice of this framework was justified with the simple notion of there being relatively few alternatives that would cover as many concepts at once. Potential alternatives could have been institutional fit in socio-environmental systems or path dependency in socio-technical systems (Epstein et al., 2015; Köhler et al., 2019), but I considered this to be too abstract and thus difficult to operationalise in my study. However, given its breadth, not all concepts that were touched upon by Primmer (2011) in her framework could be covered in this study. The issues that I consciously

chose to omit were those referring to the *logic of appropriateness* (March, 1994) and *specialisation* from the side of organisational adaptation (Nelson, 1991).

However, when we think about institutional adaptation, we must also remember to define institutions: Institutions are clearly defined as formal and informal rules and norms that govern the behaviour of individuals and collectives (North, 1990). In contemporary sociology, the term institution has been understood as a complex self-reproducing social form, for example, Turner (1997) has described it as a "complex of positions, roles, norms, and values lodged in particular types of social structures[…]". In the following chapter I will provide insight into how I gathered the data and which methods I used.

4. DATA AND METHODS

4.1 Qualitative approach

I chose to operationalise Primmer's (2011) framework to analyse the institutional adaptation of actors involved in and/or exposed to the extension to existing EPR in Finland by using a qualitative research approach. Qualitative approach is deemed suitable for drawing deep insights and interpretations of complex phenomena, which would be difficult to gain through a quantitative approach based on structured surveys; it is therefore a suitable approach to answer questions about experience, meaning, and perspective from the viewpoint of the participant (Hammarberg et al., 2016). Additionally, the relatively low number of potential participants (i.e., organisations) was another important reason for harnessing a qualitative approach.

The data were collected in late 2019 by conducting six in-depth interviews in Finland and one in Luxembourg (Table 1). The organisations that were approached included those that have been recognised as common stakeholders in EPR schemes throughout the life cycle of plastic (cf. Pouikli, 2020), including two representatives of the responsible national authority and representatives of two producer responsibility organisations at both Finnish and European levels. Other interviews were conducted with two representatives of a forest industry interest group in Finland and with one special researcher from a national research institute. Attempts to organise interviews with the representatives of the Environment Directorate-General and the Directorate-General for internal market industry, entrepreneurship, and small and medium enterprises, waste management companies, and buyers of recycled plastic. However, these attempts failed for reasons such as limited organisational resources for taking part to interviews. The representatives, or key informants in this case, were identified through a careful reading of relevant policy documents and contacted by screening online directories. Some of informants were also identified based on a recommendation from some of the other informants. As common to qualitative interpretivist approaches, the sampling method was purely purposive (Tongco, 2007).

Table 1. Overview of interviewed informants

ID	Type of organisation	Headquartered in	Role in organisation	Date	Duration	Form of interview
NA1	National authority	Helsinki	Project owner	29 October	45 min	Telephone
NA2	National authority	Helsinki	Head negotiator to the EU	12 November	45 min	Telephone
PO1	Producer responsibility organisation	Helsinki	Managing director	12 November	45 min	In person
PO2	Producer responsibility organisation	Luxembourg	Managing director	11 November	30 min	Telephone
WIG	Wood products industry interest group	Helsinki	Senior expert	31 October	30 min	Telephone
FIG	Forest industry interest group	Helsinki	Manager	8 November	50 min	In person
NRI	National research institute	Helsinki	Special researcher	16 December	45 min	Telephone

The informants were given the background details of the study in the beginning of each interview. They were also assured that their names, names of their respective organisations, and answers would be kept confidential. All interviews were also recorded to allow for later transcription of the audio data. A permission to record was asked on the onset of each interview. Telephone interviews were recorded with the telephone on speaker mode.

The interviews were semi-structured to allow for flexible interaction with the informants and not to restrict possible follow-up inquiries (Warren, 2002). Consequently, the order of questions varied slightly across the interviews. The interviews in fact ended up being more like discussions than interrogations. Occasional prompts to sustain the flow of the conversation were given.

I had formulated a compact question sheet with questions based on the legal and technical sides of the EPR extension as well as with questions deriving from Primmer's (2011) framework to operationalise institutional adaptation. The former, the technical questions, served to warm up the conversation and to keep the atmosphere familiar to the informants. Additionally, they served to quell my personal thirst for latest technical details concerning waste management. The latter set of questions included more specific questions to query about the recognition of the plastics problem, about the societal demand for addressing this problem, about perceived complexity of the EPR extension, and learning and innovation, and about inertia. Lamentably, due to the time constraint, the breadth of the framework could not be harnessed in full. For example, the issue of isomorphism could not be covered. Some of the questions included in the first interviews were also dropped soon thereafter as they presented little benefit for the study. The question sheet has been attached to this document as an appendix.

4.2 Content analysis

The interview data were analysed following the principles of conventional qualitative content analysis (Huberman et al., 2014). The data were transcribed before coding sequences of text according to categories based on recurring characteristics and as proposed by the institutional adaptation framework. The text that fell into different categories was analysed to synthesise the key insights and interpretations of the phenomenon.

4.3 Reliability and validity

The reliability of the qualitative approach was assessed according to the three points by Kirk and Miller (2012). The *quixotic* reliability was not considered threatened as

the interviewer and informant were always discussing a topic familiar to both. The *diachronic* reliability was assessed by having the interviews within a two-month period. The *synchronic* reliability was ensured by recording the interviews and by sticking to the question sheet.

The validity of the data and the results that are derived are difficult to evaluate in terms of qualitative research. The interpretations are always based on the researcher's judgement that is always bound to the actual data collection period. The studied political project has also seen changes since I conducted the interviews. Even if the validity and usefulness of my qualitative analysis is in many ways left to be judged by the reader, the use of in-depth interviews should have produced more valid data than the option of using closed survey questions in the sense that it was possible to dig deeper into unforeseen topics that emerged during the interview (Kirk and Miller, 2012). Additionally, the studied phenomenon can never be described in a report as it appeared to the researcher during the interview. More generally, research can never produce an airtight understanding of the state of affairs in a complex reality (Silverman, 1993, pp. 224–229).

More importantly, the validity of language differences was assessed and paid focus to as the author is Finnish by native tongue, and as six out of eight interviews were made and coded in Finnish. van Nes et al., (2010) have pointed out that using quotes that have been translated possesses always some risks, as the words are not the informants own anymore. They recommend the use of professional translators to ensure the validity of translated data, however they also admit that this adds costs to the study. On the next chapter I will introduce the findings dissected from the interviews, the citations that are presented were translated by the author, pursuing great accuracy with the focus on capturing the original meaning. The single interview in Luxemburg was made in English and will be therefore cited as it was recorded and transcribed.

5. RESULTS

5.1 Policy implementation challenges

Complexity

In terms of *complexity*, as defined in chapter three, the informants associated it with a multitude issues on broad scale. Generally, concerns about the adaptability of the new legislation concerning the EPR to existing systems across the EU; about the division of implementation and monitoring responsibilities between public and private sectors; and about the overlapping initiatives (CEP, PS, SUP, WFD, PPWD, EPR, and even the upcoming European Green Deal) that intend to handle the plastics dilemma emerged from the responses.

The informants were exceptionally unanimous in this regard. More specifically, almost every informant referred to the complex combination of high level of ambition, tight schedule, and insufficient consideration of regional needs and potentials across the EU member states (see *plurality*, below). Additionally, several informants, especially those representing the producers (including the wood products industry) were anticipating more costs than benefits arising from such complexity. The informant representing the national authority brought forth the example of the posed new recycling targets for industrial packaging and discussed the challenge of adapting the national legislation as follows:

"...it has such big new requirements, especially for plastic packaging plus wood packaging, both the recycling targets and the achieved recycling rates are currently so low, and the new targets set by the directives, plus calculation methods, set or are so high that they are quite difficult to meet, and requires us to make major changes to legislation and to make separate collection more efficient." [NA2]

However, despite all the complexity, there was also some honest understanding for the reasons underlying such high level of ambition and rapid action from the side of the EU. For example, the representative of the Helsinki-based producer responsibility organisation stated the following:

"There were big changes in producer responsibility of packaging through those directives, and how they are applied in Finland, well, it's going to bring lot of extra costs and responsibilities to our customers, the producer responsible companies. […] There must have been as many original purposes as there were actors which have tried to influence it. It could be said, that the original idea is the environmental protection and greenhouse gas reduction, when thought out nicely. Which itself for many has been a cause for action. Of course, recycling is generally a good thing for the environment" [PO1]

Plurality

Although all informants recognised a high level of overall complexity in relation to the new EPR legislation and associated policies, the views focusing specifically on *plurality*, the diversity of the policy goals and types of organisations as constituents falling under the scope of the legislation, were more divided. Interestingly, the industry representatives in Helsinki and Luxembourg had somewhat diverging profiles of opinion regarding the inclusiveness of the new EPR scheme in terms of implementation. This is exemplified in the conflict between the following quotes:

"For example, in terms of plastics, it can be said that the industry and the recycling industry have been considered in preparation of the legislation, because the recycling goals are not the same for all materials. If they would have been the same, the goal would have been one hundred per cent. Now it is 50 per cent for 2025 and 55 per cent for 2030" [FIG]

"The problem is, at the moment, that we have totally different status of the systems as they all started on different timing. We have a completely different national background of the legislation. Some countries just implemented the directives on the minimum scale, like the 22.5 per cent plastics recycling target. In the meantime, other member states implemented much stricter, higher targets like Belgium, Netherlands, and Germany with targets of 40-50 per cent." [PO2]

The above quote by the representative of the Luxembourg-based parent organisation of European producer organisations expresses concern over plurality in terms of policy

implementation at the European level. However, the same informant also acknowledged the policymakers' awareness over this issue, which they had, according to the informant in the policy process. He did not make any other explicit references to the other flexibility mechanisms, such as transition periods, that is likely to reflect the informant's position in an advocacy group.

Professional and organisational factors

Professional and organisational factors were noted in the answers from both informants representing the producer responsibility organisations, this was somewhat expected as they were closest to the practice of the EPR from the interviewed actors. Although the Finnish producer responsibility spokesman expressed more openly his criticism towards the policy preparation than his colleague from Belgium, especially the timetable was a factor that both shared a similar message:

"The implementation schedule for legislation is too tight. The (article) 8A should be implemented into the national legislation, and there are no application instructions. Which means, that if the member states wish to utilise these instructions, it is already clear that the countries do not have enough time for creating the national legislation in the given time. There is no sense. It is too rushed. [PO2]

"I'm a little bit afraid that as there is not yet one country with a new national implementation, and it seems that most of the countries will be one or two years late with the implementation, that earliest 2030 we will have a comparable situation in all the countries." [PO1]

However, the Luxembourg informant also interestingly reflected the role of the industry he represented, and how it had succeeded in leading the discussion and shaping public opinion towards producer responsibility companies as a viable and important part of the solution in addressing the challenges posed by plastic packaging.

"We are in a sense in a corner and running behind the public opinion, so we have to try to again proactive and the leader in the discussion and show that plastic is not a bad material, that if we have the right systems in place everything is fine, but we are still not there."[PO1]

Other than the previously stated, *professional and organisational factors* did not stand out dramatically from the results. The other national authority representative and Forest industry spokesperson both discussed that the stakeholders had been kept in loop regarding the national legislation on the EPR extension and on the negotiations around the upcoming European Green Deal scheme.

Bounded rationality

Challenges arising from *bounded rationality* were detected in the discussions with the informants representing the national authority and the forest industry association, both voiced the same challenge within the EPR extension: The requirements of product and packaging design. National authority informant acknowledged the there is criticism towards the given requirements to the packaging design, the requirements that aim to steer the recyclability:

"Quite a lot has been criticised - when the original (purpose) of the producer responsibility is to guide the product design and (…) the products compatibility to the waste hierarchy. It has been seen as effective in guiding and increasing recycling, but this product design may not have been quite successful so that it could require some eco-product design requirements to support it. After all, the SUP directive became something that requires attention to be paid to product design as well. Although the Packaging Directive sets out certain minimum requirements for packaging, the Commission is currently examining how to better implement the minimum requirements. In a way, it may be that other actions are coming into law (…) that guide product design better than the current one. This may be more left to increase recycling." [NA2]

The forest industry informant expressed this same view, that the requirements made into the end of the life cycle of product (and packaging) are only a half way solution as the creation phase is left out of the equation. In addition, the informant did confirm the commitment to the ideals of the policy:

"*This supports the long-term goal of a circular economy - this supports the fact that producers are being cramped in the sense that there must be no products that cannot*

be recycled, and I think it is wrong, since we (…) climb up the tree bum-first (by) regulating the end of life of the product.(…) when it could not have even been influenced by (the producer)" [FIG]

Representative of the Finnish producer responsibility organisation took his assessment of the situation even further. He somewhat questioned the rationality of the strong forces driving the EPR against the perceived environmental problems in Finland, and voiced his view as follows:

"When we're thinking about consumers, the media has indeed created demand with the image that has nothing to do with recycling. Plastic waste in the oceans, or in the stomach of a bird has nothing to do with the recycling rate in Finland, be it zero or hundred. Because in Finland the waste management works. (…) And then politicians of course follow the public opinion, but recycling is important, but the cause-and-effect do not necessarily always match." [PO2]

This illustrates that the informants detected some form *bounded rationality* in packaging and product design policy and brought forth the idea that the packaging recycling policy could benefit from also detecting the actions that could be made in the creation phase of product and packaging.

Street-level bureaucracy

The factor of *street level bureaucracy* somewhat overlaps the *professional and organisational factors* as the idea of it is based on the professionals acting within the sphere of the policy, so this section could have justifiably been dissected under one title. The informant representing the Finnish producer organisation brought forth his opinions towards the technical and practical aspects regarding the extension of the EPR, in a quite sceptical manner:

"*It would seem that these (directives regarding EPR) are pretty much just something thrown together" [PO2]*

As the quoted informant works closest to the "street level" and close to the daily practicalities of producer responsibility and recycling he could be understood, at least by some means, as the *street-level bureaucrat* of the interview sampling.

5.2 Organisational adaptation challenges

Recognition of social demand

The questions assessing the *recognition of social demand* yielded the most answers in which all the informants clearly stated that the detect social demand for the policy, and many also spoke out similar underlying drivers for the demand as already stated by EC: littering of the environment, sea plastics, risen environmental awareness, etc. In terms of specifying the social demand distinctively to EPR policy and/or industrial plastic packaging, the answers focused more on the general demand for legislation to hinder the problems caused by plastics, and of which the EPR extension was seen part of. As the informant representing the Finnish research institute voiced:

"More broadly, the pressure is probably already high in terms of the circular economy and climate issues. If you initially think, then on the packaging side it has been in the background when you think about the everyday life of consumers, we see huge amounts of packaging in our own waste stream that are large in volume. Although it is only a small portion of the whole, but it is so visible. There has also been political pressure from citizens and producer responsibility has been a way to collect points. [NRI]

Based on this, it could be argued that the demand derives from the everyday actions of consumers' and transfers through value chain to the producers, for example a consumer planning to buy sawn timber from a hardware store who themselves have bought the timber from a wood products company, is concerned about the recyclability of the timber package wrapping. However, both interest group informants from wood product industry and forestry industry pondered more on the social demand aspects specifically on their business sector:

"Yes, there is this shared experience that packaging is unnecessary, especially depending on how green the person thinks. (...) This leads to pressure being put on the producer to work out a solution either by reducing packaging, or recycling it, or

reusing it. But surely the receiving end wishes for a legislation to shift the responsibility of the packaging to another party." [WIG]

"…it has been considered that industry still pays too little for the waste management and recycling of the products it produces. Certainly, this trend continues that the industry is wanted to take more and more responsibility for the products it produces." [FIG]

To summarise, the all informants acknowledged the presence of a social demand for a policy tool to assess the problems rising from the use of plastic packaging. The general tone was approving but also acknowledging the somewhat populist overtones ruling the discussion on plastic use, industrial and other.

Learning and innovation

Of the seven interviewed informants all discussed various themes regarding *learning and innovation*. It was not considered a major adaptation challenge as the informants saw that innovation had been one of the original goals of the CEP. Many also continued to discuss the potential sources for research and development (R&D) funding, one of them, EU's Horizon 2020 program was anticipated as one of the potential funding members for possible EPR projects. The informant from forest industry interest group reflected the following when inquired about the possibility of government funding:

"(…) the funds have been allocated to research and development, so it must be seen from two perspectives: whether plastic recycling can be promoted in some way and probably also enforced, and (…) through the construction of recycling infrastructure, (the benefit) may not come directly to our industry (…) unless it helps to ease the costs by making packaging easier to recycle. (…) the other side is whether R&D money is given to the industry, for example, to develop and promote solutions that are based on renewable raw materials…" [FIG]

Additionally, there was some discussion on whether the new EPR would already - before it's national legislative implementation - result in changes on the product and packaging design based on the foreknowledge given by the EC. When asked about this and the scheme's ability to meet the goal of boosting innovation within packaging

design, the national research institute informant shared his personal view that there would already be notions of companies making these changes:

"It must have had a slightly variable effect; some people think that this has not affected product design and waste prevention at all, but there are some signs of that;" [NRI]

The wood products industry informant discussed the topic of possible new innovative packaging materials that could reduce the use of fossil-based plastics and make the recycling easier. Apart from this, bio-plastics did not came up as a possible base for innovation among the other informants:

"If Stora Enso could now replace all plastic with a bio-based option that is easy to dispose of, it should be an advantage for Stora Enso. That it eliminates that plastic problem in its own way." [WIG]

Interestingly, among few informants, chemical – and biological - plastic recycling was one of the big technical themes in terms of innovation on recycling infrastructure stemming from the requirements of the new EPR. The discussions based on that focused on the recycling and waste companies instead of the big population of organisations using plastic packaging, let alone wood products companies. Despite of this the informants held great expectations for the issue and saw that it would benefit all members of the recycling value chain.

Networks

Four different informants saw adaptational challenges that could be fitted under the umbrella of *networks,* the major topics that rose from these discussions varied from visions of B2B-companies sharing information and enhancing recycling processes to wider intelligent material streams within a network of circular economy companies, or as the informant from national authority phrased it:

"A recycling park is an old-fashioned name but a similar (...) industrial symbiosis would arise where the material flows are close, and the users are close. (...) But in that value network, intelligence (...) and intelligent factories are needed on the factory

site, and that the waste (…) becomes the raw material for a new material (…) and so such solutions should be developed." [NA1]

Subsequently, the Luxembourg informant focused his concern on how well the numerous programs, public and private, coordinate their effort to maximize the outcome. When discussing the possible resources designated by the EC to help in the adaptation of EPR, the informant brought forward the concept that even a substantial monetary investment may be in vain if the coordination between actors is lacking, he voiced his view as follows:

"There are very good new initiatives of the European plastics converters, they are putting all the various funded projects together on one home page to bring them together. I think we have forty-, fifty-, sixty different projects at the moment in regard to plastics and circularity, so I am a little bit afraid that we use spend two-three-four time the money for the same things. And this is of course stupid. Money is available. I don't think that funding for example from the European commission is a problem - there can be even too much money there. But to use it in the right, coordinated way - this is again one challenge we have to overcome" [PO1]

Inertia

The factor of *inertia* overlaps the other adaptational challenges maybe the most as it can be understood as the general slowness to respond. The informant from Luxembourg saw inertia from his standpoint as he discussed the rollout of the EPR scheme across Europe. He stressed the situation in adapting the new EPR on a European scale and contemplated on the various and uneven business environments:

"Like Rinki in Finland, they are the tool of (the) obliged industry. (…) If the board has vision and ambition then the EPR system can move forward quickly. On the other side some other countries if the owners are short term thinking, reluctant, if they only see the picture of this year, then the EPR system has a very difficult stand, very difficult to move forward and to find a solution and you can see this in Eastern European countries where you have a strong competition between several EPR schemes - there your room for manoeuvre is extremely small. So, you have in the end no vision, you

can just do your daily job, and this is by far not enough for the new challenges that we have." [PO1]

As discussed by Primmer (2011), inertia may be the result of organisations poor focus on the social demand, as far as the informants were concerned many noted the fast roll-out and implementation schedule of the directives steering the EPR scheme but did not specifically express the possibility that the organisations just could be too slow in their reaction.

5.3 Summary of the analysis

The informants have emphasised different aspects to a different degree, and the categorisation of certain risen topics under the best fitting challenge can be difficult, as categories tend to overlap each other, as also stated by Primmer (2011). As informed earlier, the aspects of *isomorphism* were omitted from the study due to time restrictions. The distribution of discussed challenges among the informants can been seen on table 2. A blank cell represents that the challenge did not come up on the interview, one plus sign means that it was discussed, and two plusses indicates that the topic sparked further discussion and the informant stressed the specific challenge.

Table 2. Summary of the challenges of institutional adaptation to the EPR extension

	NA1	NA2	PO1	PO2	WIG	FIG	NRI
IMPLEMENTATION CHALLENGES							
Complexity	+	+		+		+	+
Plurality				+	+	+	
Professional and organisational factors	+		+	+		+	+
Bounded rationality		++				+	+
Street-level bureaucracy			+	+			
ADAPTATION CHALLENGES							
Recognition of social demand	+	+	++	++	++	++	++
Learning and innovation	+	+	++	+	+	+	+
Networks	+		+	+	+		
Inertia			+	+			
Isomorphism (not covered)							

As can be seen from the table, the theme of *social demand* was the most abundant, as was the expected challenges and expectations for *learning and innovation*. The distribution of answers was quite even between adaption challenges and the implementation ones, among the informants.

6. DISCUSSION AND CONCLUSIONS

6.1 Findings

Despite the numerous benefits of using plastics, they are currently causing many well-acknowledged problems across the globe, including marine littering. Under its new CEP, the EC has introduced an extension to the existing extended producer responsibility scheme in the use of plastic packaging to combat this problem in the EU. This policy is relevant also to industries such as the wood products industry that uses plastic packaging to protect their merchandise. In this thesis, I have relied on a qualitative approach based on a number of key informant interviews to explore the many challenges related to the implementation of the EPR extension by operationalising Primmer's (2011) conceptual framework of *institutional adaptation*. The framework remains novel for combining two previously separate strands of literature, namely policy implementation and organisational adaptation, and neither had been applied for the analysis of EPR schemes nor policymaking at the European level, at least not to the authors knowledge. Understanding the challenges of institutional adaptation is relevant also for designing and implementing effective and efficient, even equitable, environmental policies.

In the beginning, I sat out two research questions for myself: how do involved actors recognise and perceive the challenges in 1) *implementing* and 2) *adapting* to the extension to the existing EPR scheme in the use of plastic packaging of wood products? To answer the first one, based on my analysis, it is evident that the actors perceive the main challenges of implementing the EPR extension to be related to the complexity resulting from many overlapping pieces of legislation that target recycling of plastics in Europe, the excessive rush in rolling out the relevant legislation and implementing it to legal frameworks in each EU member state, and insufficient consideration of the diversity of actors in highly diverse national contexts across the EU. However, in terms of uncovering the challenges of adapting to the EPR extension at an organisational level, the answer to the second question, the informants expressed a high level of consensus in recognising the social demand for addressing the problems with plastics more generally as well as for introducing the EPR extension. Several informants also endorsed the European legislators' emphasis on finding business-

driven approaches to organising the EPR extension and on binding the entire policy to innovation support that many informants viewed as contributing to the emergence of new business opportunities in line with the principles of the circular economy transition.

Based on these main insights from the analysis, actors find the EC's approach to implementing the EPR extension laborious. However, they recognise the problem and are much more welcoming, when they consider the possible new investments and innovations it could bring, not to mention the possible support from the EC that helps them in investing in and upgrading their existing operations. In conclusion, actors clearly prioritise their own needs and aspirations in their own limited realities – that is, they show limited understanding to the much broader and much more complex challenge of solving the plastics problem at once and achieving a simultaneous transition to a circular economy in Europe.

The EC is obviously trying to address many issues at once, possibly too many, and relying on legislation instead of voluntary actions to achieve a grand goal before it is too late. As the literature reviewed in section two suggests, the EC's focus on the EPR extensions as a tool to address this problem is well-founded. For instance, take one of the first EPR schemes that ever was implemented in the EU that proved that the recycling rate of ferrous metals and batteries could be dramatically increased in the automotive industry in relatively short time (Gerrard and Kandlikar, 2007). However, the EPR clearly is not a panacea. Pouikli (2020) has pointed to several improvements to the existing EPR schemes for the development of a more robust legislative tool. For example, they could be made more transparent to ensure a fair and a clear division and monitoring of responsibilities and their sanctioning for misconduct could be made stricter to fulfil the transfer of financial responsibility of recycling problematic materials from the local governments and taxpayers to the producers.

Of the relatively few alternative frameworks that I found, including institutional fit and path dependency (Epstein et al., 2015; Köhler et al., 2019), I chose to use Primmer's (2011) conceptual framework over relatively few alternative that identifies various challenges in relation to institutional adaptation. I think that this framework worked well and was thus the right choice for this study. Importantly, it offered several

important concepts, such as bounded rationality and inertia, that were crucial for understanding both the implementation of and the organisational adaptation to the EPR scheme. However, the framework is also rather extensive. It was somewhat difficult to operationalise and cover all the different concepts in qualitative interviews. This is also why it is too early to determine the goodness or badness of the framework based on the findings of this study, but the list of concepts in it is certainly a useful toolkit for anyone interested in analysing institutional adaptation regardless of the given policy domain. Unfortunately, one of the key concepts, namely isomorphism, could not be covered in the interviews as there were already many concepts to be covered in a single interview that had been scheduled to last a maximum of one hour. In other words, to keep the conditions for the informants humane. Another related issue was the fact that my own understanding of the concepts at the time of the interviews was somewhat superficial. Although I started grasping these concepts in the course of interviews, many of them did not open fully until I begun analysing transcribed data.

6.2 Conclusions and suggestions for further study

In hindsight, some of the questions that I had prepared for my question sheet could have been refined and even expanded to some extent to better operationalise these concepts. For example, one could have probed about *inertia* by asking questions such as: *do you think that the EPR extension could result in bankruptcies due to lack of resources and competences to meet the legislation?* Or by asking a related follow-up question: *could the EPR extension lead to offshoring to escape environmental legislation and associated costs?* And to cover the issue of *isomorphism*, one could have asked: *do you see risks in conforming with the EPR extensions resulting in companies copying each other instead of researching for the best practices?* These questions could all be covered in upcoming analyses of institutional adaptation.

The qualitative approach also worked out reasonably well for hearing the voices of the actors involved in the EPR extension. As suggested by Saaranen-Kauppinen and Puusniekka (2006), qualitative studies can be made in many ways and each study is its own version of the studied phenomenon. It is also a cumbersome method, which I have certainly noticed. However, a qualitative approach enabled the best assortment of solutions for the study. Conducting a quantitative study would have been difficult as

there would have been relatively few organisations to survey for such a study. However, a few organisations that could not be included in this study could have brought additional insights and potentially more diverse perspectives to the study. For example, despite various attempts, I could not schedule an interview with any of the key legislators from the EC that could have shed light on the broader project within which the EPR extension is situated. Hence, one could argue that my sampling was more skewed to the side of the organisational adaptation than that of policy implementation. Additionally, I did not reach out to any of the potentially relevant civil society organisations or environmental non-governmental organisations that could have taken another standpoint.

As the nature of EPR legislation is EU wide, my initial idea was to include and compare institutional adaptation in two different countries: Finland and Austria. Both countries would have had similar recycling infrastructures and wood products industries. Interestingly, however, the scheduling of interviews with Austrian counterparts proved to be extremely challenging. After several failed requests, Austria was left outside of the study. In this sense, the cultures of these two nations in this regard clearly differed. The data from Austria would have been valuable as it would have made possible to compare the challenges of institutional adaptation across these countries. However, considering the time and labour required to complete the analysis even with one country, I am quite content that they did not find the time for the interviews

Taken together, this study has revealed that there are many challenges, as there are opportunities, facing the roll out of the extension to the EPR scheme in Finland and at the European level. However, due to the limitations outlined above, there is a need for more research that builds on more extensive data. It would also be interesting to apply and develop the institutional adaptation framework based on results from cross-comparative studies and in terms of other policies that attempt to address multifaceted environmental problems.

6.3 Managerial Implications

Based on the information gathered for this study few implications could be made as to what the EPR will mean to the organisations and companies using wood products packaging. The effects to business should be noted regarding the new recycling rates for plastic which will tighten substantially: The rate will be 50 per cent for the year 2025 and 55 per cent for 2030, the calculation method will also change as plastic rejects at the recycling centre will not anymore be counted into the concluded recycling rate. Other implication is that the profits from the recycled material are expected to not to cover the costs of recovery and recycling, so the organisations should not rule out this possible cost effect to their business. The recycling of various plastic material streams will still require novel innovations in sorting and processing the many different types of plastics. According to the insight gathered from the interviews, innovative technologies such as artificial intelligence and machine learning can prove to be powerful tools in creating effective sorting procedures, in addition with developing such still-early technologies as chemical and biological recycling. In short, organisations involved in the use plastic packaging to protect wood products should closely follow this broad field of EPR as it’s now changing more than ever.

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APPENDICES

A1. Question sheet for semi-structured interviews

LEGISLATION

- What is the current status of EPR-law in industrial PP & LDPE packaging?
- What is the situation with Circular Economy Action Plan / industrial use of plastic packaging?
- Have they been taken forward into national legislation?
- What are the main steps in the EPR-legislation process? (from EU regulation and action plan to a final law in a member state?
- Is waste directive linked?
- What is the schedule for the EPR-legislation and implementation process?
- What are the immediate and long-term goals of the EPR legislation?
- How do you see the impact of EPR to industry using plastic packaging?
- Will there be fees?
- Will there be incentives?
- Investment support?
- Tax cuts?
- Who will govern that the EPR-legislation is followed in practice?
- How will the EPR distribute between plastic producer, plastic packager and end user?

INFRASTRUCTURE

- How do you see the distribution of responsibilities in needed new industrial plastic collecting and recycling infra?
- How do you see the current plastic recycling network for industrial customers?
- How do you see the distribution of costs among value chain?
- Example price list
- Ton price of plastic moving from mill to waste mgmt. company?
- LDPE & PP in focus, others as a bonus
- How much new entrepreneurship you anticipate as result of the EPR law?
- What kind of? At what point of the recycling value chain?
- How much new product innovation will be anticipated?

Circular product and packaging design

- Are there funds designated for driving the change on circular product design?
- How about regional development funds? Other sources of funding? From EU

IMPLEMENTATION CHALLENGES

- What types of EPR implementation challenges do you see?
- How do tackle complexity?
- value chain, different plastics, long distance logistics, technical capability to utilise?
- how much cost increase the EPR will bring?
- Is there funding available for R&D?
- Funding for business development and piloting?
- How you recognise pluralism in implementation?
- How was the industry and recycling industry considered? Applicability of the law?
- How visionary you see the law?
- What is the ultimate vision of recycling infra industrial plastic packaging?
- And how will this influence the lifecycle of industrial plastic packaging?
- How capable you see the law to be able address its original goals?
- Any changes in sight?
- Are the professionals and organisations functioning between law and practice included in the law creation process?
- How do you ensure the law process is freed from bounded rationality?
- Does the scope of the EPR law cover all relevant actors and sectors in the value chain
- Will it reach all the relevant actors horizontally and vertically
- Will be effective among all of them?
- Are there stakeholders that have been left outside the scope?
- Have they been involved and empowered?
- Will there be extra street level bureaucracy?
- implementation and administering
- Collection point reachability?
- Possibility of having collection points or does there need to be agreements with recycling companies only?

ADAPTATION CHALLENGES

- How would you assess the social demand for the law?
- Is there a need for specialisation to adapt to the law?

- Specialisation of the recycling infra in the value chain?
- Is there a need for learning and innovation to the law?
- Have the different networks been acknowledged in the law?
- Sectoral associations?
- Are there barriers of implementation? Long distances, resistance for change?

A2. Plastic packaging for wood products

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